FINAL TECHNICAL REPORT
ONR GRANT # N00014-90-J-1036

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Arctic Internal Waves (CEAREX)

We successfully deployed a horizontal and vertical array of instruments beneath the Arctic pack ice during the Coordinated Eastern Arctic Experiment (CEAREX). The measurements were made near 83°N and 5° to 11°E at the "O" Camp during March-April 1989. A variety of sensors were deployed: 7 current meters, 11 temperature sensors, 9 conductivity sensors, 5 temperature-conductivity recorders, and 1 acoustic Doppler profiler. The measurements were made between the surface and 250 m depth; horizontal separations ranged from 75 to 500 m.

The drifting ice camp permitted us to observe the upper ocean internal wave in a variety of different background conditions including: quiescent deep water, strong diurnal oscillations, and an eddy. Spectra and coherences of the velocity and temperature time series show that the internal wave field varies significantly with the background. In the quiescent period over deep water internal wave energy was the lowest observed during CEAREX--about one-half of the mid-ocean value given by the Garrett-Munk model (GM). As the camp drifted over the slope of the Yermak Plateau, strong diurnal oscillations were observed. The energy in the high-frequency internal wave field also increased--to about three times the GM level. Near the end of the experiment the camp drifted over an eddy; internal wave energy dropped significantly to levels approaching the initial quiescent deep water.

One of the most interesting and unexpected phenomena observed during CEAREX were high amplitude wave packets propagating from the Yermak Plateau. These packets occurred concurrently with the strong, barotropic diurnal oscillations that are found on the slope of the plateau. The horizontal array of instruments was ideal for determining the propagation direction (about $\sim 20°$ west of north) and wavelength (~ 650 m) of the waves (Czipott et al., 1991).

The observations from "O" Camp provided a data set to test models that link dissipation rate with properties of the internal wave field. The internal wave observations made in this project have been combined with turbulent measurements by Dillon and Padman to compare with a variety of model predictions (Wijesekera et al., 1993).

PUBLICATIONS

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